SOME POINTS IN THE TECHNIQUE OF THE TREATMENT OF FRACTURE OF THE PATELLA BY SUTURE.

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SINCE the true anatomico-pathological conditions that exist in fractura patellæ, and those that attend it as sequelæ have come to be understood through the labors of the surgical world in general, and by the practical explanations of König, Hutchinson, Volkmann, Macewen, and v. Bergmann in particular, the future seems to present for this lesion but one result, and that a *sine qua non.* This desideratum is a true osseous union, with no diastasis of the fragments, complete *restitutio ad integrum* in an anatomical and physiological sense. Now to achieve this result scientifically, and with certitude (where the fracture is transverse or oblique and complete and of sufficient magnitude to require any treatment but that of simple rest in extension) the lines of fracture must needs be inspected by means of section, and perhaps secured together by sutures, etc. Several varying methods have been employed in making this patellar section and several in its union by suture, and only these two points of the subject will be discussed here, in connection with a proposed technique that covers both of these heads, *i. e.*, inspection, and retention of fragments—a method by which the writer claims all can be achieved that was, by the old methods with the bonus of less danger.

The technique of the section for exposing the fracture, so far as the writer knows, has been of three kinds: Volkmann's transverse cut having a plane corresponding with the line of fracture of the distal fragment and of variable length; the bow section of Textor, Mackenzie and others, recommended also by Koenig; and the median longitudinal section of Billroth. The first and last methods have this uncontrovertible defect that by reason of the cutaneous wound lying parallel with and above or crossing the patellar fissure, it offers a direct route for infection of the joint. We further postulate that the cutaneous and osseous tissues in which the sutures are laid, are often contused, stretched, swollen and devitalized in a high degree—at least in direct and in compound fractures this is true. Simple cutaneous suture suppuration also may here infect the joint; and possibly this cannot with certainty be prevented in this situation, owing to the peculiar anatomical character of the cutaneous covering—the skin over the patella being set with the openings of numerous hair, and sebaceous follicles which are large, and might be receptive to contagium—and the skin here like that of the scrotum can not perhaps be made definitely aseptic. It should be observed also that this skin is a *locus minoris resistentiæ* as is shown for instance by the fact that furuncles frequently appear here: it is also a point of election for phlegmonous inflammation of the skin, and bursa, for psoriasis vulgaris, etc. Now if this hypothesis is true, can it be wondered at that cutaneous suture suppuration should be the rule? Investigation of the most precise sort should certainly be made with this point in view as to the anatomy, and pathology of the pre-patellar tissues.

Other objections to these methods are they are bungling, the subcutaneous and superficial position of the patella hardly leaving room for these two tiers of stitches or for the ends of wire, pegs, etc. Again marked pressure in the middle and superior recesses of the joint, *i. e.* above the alar ligament, such as might come from a hæmarthron or from inflammation within, would have a tendency to cause fluids to be forced through the patellar fissure, and a more serious inflammation might then take place by retrograde infection. Again attention should be directed to the complex and possibly dangerous structures which these wounds traverse, *i. e.*, skin, subcutaneous connective tissue, bursa, prepatellar aponeurosis, bone, and blood, also the free blending of joint, and wound fluids. The bow cut of Koenig involves too much tissue, among other things, a part of the patellar vascular arch, and would favor hernia, and atrophy of the capsular ligament, etc. It would also interfere with early massage, and joint movement as would the other methods. It has decided advantages however over the other two methods.

If one while sitting will place the foot in a chair, and let the the knee fall into passive extension, it will be found that quite a handful of tissue can be grasped from off the patella. If it be further examined it will be seen that just here the skin and connective tissue is more loose and elastic than elsewhere on the leg. It greatest stretch is median longitudinal with the patella, and can be about equally drawn above or below the patella. The length of stretch in most cases is about one inch measured on the skin from the transverse middle of the patella. Or if the skin be drawn up, and the patella shoved down, and then ink marked across its middle ; when the skin is let go the mark will about represent the lower border of that bone. If the skin be drawn down the reverse will occur. From side to side the elasticity is about one half this. It will be noticed at the situation of the ink marks that the skin is quite different in character from that which covers the convexity of the patella, and the subcutaneous connective tissue is here slightly different both in the length and in the direction of its fibres.

The method proposed is simply to put the skin on the greatest stretch and to cut down on the fragments by a transverse incision—whether the skin be drawn up or down depending on the amount of separation of the upper fragment. Naturally the incision would be made above if there was much retraction; or if there be much contusion of tissue on or below the bone, the incision is made above in the sound tissue. Through either of these openings the fragments could be freed alternately, and inspected, then sawn, drilled or sutured as might be ; or an hæmarthron or fluids could here be removed from the joint, the capsular ligament sewn, etc. An assistant in the meantime, keeps the skin stretched as necessary, either with fingers, retractors, or Muzeaux forceps. Of course the strictest antiseptic prophylaxis and treatment should attend throughout.

In cases of compound fracture of the patella, with much destruction or pulping of the skin it is suggested that the doubtful tissue be excised, and that the sound skin, be drawn over the fragments. Compensation for the resected skin could be obtained by incising a large Y or an arc above or below the resection wound and far enough removed to be safe, the concavity of the arc or the fork of the Y, looking towards the wound or by a tenotomy of the tensor vaginae femoris muscle.

Furthermore, it can be said for this method that it would allow of the extra-articular methods of suture, as employed by Volkmann and Riedel, or the intra-articular fastening of Kocher. Either of these methods could be used after the toilet of the patella was complete; all that is then necessary after the skin is relaxed, and the parts *in statu quo ante* is to make a counter opening at the opposite end of the patella, and from these two openings the catgut or silver could be manipulated by an armed needle around or beneath the patella (subcutaneous or subpatellar.)

In laying the last stitches in closing the cutaneous wound as a refinement of technique wounding of the skin could be avoided by the continuous sunken catgut stitch, thus eliminating infection through the skin appendages.

The particular claims for the method are that it admits of an almost subcutaneous exploration and operation on the diastasis and in the joint, and that it may even progress like the ideal subcutaneous wound to healing. It involves normal and less suspicious tissues. It is consistent to true plastic surgery, and to the anatomy and physiology of the parts involved. By making a proper use of the elasticity of the skin in this situation, the wound in most cases need be but small for the field of inspection and operation owing to elasticity of the skin can be moved from one part to another without the necessity of essentially enlarging the original cut. In this it resembles the laparotomy technique of Lawson Tait, in so far that it is an endeavor to bring the entrance operation wound to the *minimum.*